International Journal of Plant Breeding and Genetics ISSN 2756-3847 Vol. 8 (3), pp. 001, December, 2021.
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Perspective

An overview of backcross breeding in plants

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Accepted 16 December , 2021

DESCRIPTION

Plant breeding is the study of altering plant characteristics to achieve desired results. Plant breeders aim to develop a certain outcome of plants and perhaps new plant varieties, narrowing the genetic diversity of that variety to a few biotypes in the process.

Backcross breeding allows breeders to transfer a desirable characteristic, such as a transgene, from one variety to another's preferred genetic background (recurrent parent, RP). If the desired characteristic is caused by a dominant gene, the technique entails four rounds of backcrossing over the course of seven seasons. If the gene is recessive, additional generations of selfing are required, which means nine or more seasons are required. The number of backcross generations used can be used to calculate the rate at which the DP genes are deleted and the RP genes are regained in the genetic composition of the plant. With recent developments in marker technology, which allow breeders to control the gene of interest as well as the genetic background, this rate has skyrocketed.

Backcrossing is the most common plant breeding approach for incorporating one or a few genes into a superior or adapted variety. In this procedure, the backcrossing parent possesses a lot of desirable traits but is missing a few. The most basic form of MAS is marker-assisted backcrossing. Backcrossing with DNA markers improves the efficiency of selection. The purpose of marker-assisted backcrossing is to increase a specified characteristic by transferring one or a few genes/QTLs from one genetic source (the donor plant) onto a superior cultivar or elite breeding line (the recurrent parent).

Backcross breeding involves multiple cycles of crossing to the recipient line, followed by selection of the trait to be transmitted. It is used to assimilate simply inherited features from unadapted donor parents into recipient lines. By transmitting individual rust resistance genes, backcross breeding was originally utilised in flax to generate a set of rust differentials. These rust differentials have been widely used in flax rust research and as a source of resistance genes for backcrossing into flax types to reduce vulnerability to new flax rust races. Backcross breeding is crucial for transferring novel alleles from mutant populations to elite recipient lines. The yellow seed colour marker genes were introduced into Canadian flax cultivars through backcross breeding.

Backcrossing is a valuable breeding approach for introducing a small number of characters from one of the parents to the offspring. This is accomplished through hybridization and subsequent backcrossing to the recurrent parent over several generations, with each generation being selected to guarantee that the desired gene or genes are present in the progeny.

Today, the Backcross method is most commonly utilised to transfer a transgene from a good tissue culture variety to an elite experimental line or variety. It turns out that once the transgene is in the crop, crossing is more efficient than transformation processes for many crops. Because most transformation techniques are developed for a specific laboratory line, backcrossing is more efficient than converting the eliteline. Many aristocratic lines are intransigent when it comes to change. As a result, genetic engineers change their lab line into the elite line, and breeders backcross the transgene from the lab line to the elite line.

The backcross method, a type of recurrent hybridization where a superior trait can be introduced to an otherwise attractive variety, will be the subject of this lecture. The breeder has a lot of influence over the genetic variance in the segregating population where the choices will be made in this procedure. For conveying qualitative traits such as disease resistance, the backcross approach has been widely used. It works in both self-pollinated and cross-pollinated crop species. The gene for leaf rust resistance in wheat was backcrossed to better understand the uses of backcrossing. The actual back crossing process is virtually self-explanatory. You have a donor parent in the back crossing. At the end of the day, you only want to keep people who are homozygous for the resistance gene. Self-Rr plants from BC4 are required to obtain them. Progeny testing would be required.

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